Homework 1 - Calc is Short for Calculator

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1. Make the following matrices and perform the following calculations.

$$\mathbf{u} = \begin{pmatrix} 3 & 4 & 5 \end{pmatrix}, \ \mathbf{v} = \begin{pmatrix} 2i \\ 7 \\ -1 \end{pmatrix}, \ W = \begin{pmatrix} 7 & -3i+2 & -6.5 \\ i & 0 & 2 \end{pmatrix}, \ A = \begin{pmatrix} \mathbf{u} \\ W \\ \mathbf{v}^T \end{pmatrix}$$

Find $\mathbf{u} + \mathbf{v}^T$, $\frac{1}{2}\mathbf{v}$, and WA^T.

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2. Carry out the following calculations (you may need to look at some documentation for this).

$$a = e^{j\frac{2\pi}{3}} + |5 - \sqrt{5}i|$$
$$b = \log_{10}(3456.789) + \sin^{-1}(0.001^\circ)$$
$$c = \left\lfloor \left\lceil \sqrt[5]{325963} \right\rceil + \cosh(3) \right\rfloor$$

Note: $\lfloor \ \rfloor$ denotes the floor function, $\lceil \ \rceil$ denotes the ceiling function, and the inverse sine expression is in degrees.

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3. One operator that most programming languages do not have is the left divide operator (which MATLAB uses "\" for). This lets us solve linear systems of equations very efficiently in MATLAB. Read the documentation for the left divide operator (mldivide) and use the operator to solve x in the equation Ax = b where

$$A = \begin{pmatrix} 1 & 2 & -2 \\ 2 & 1 & 0 \\ -1 & 3 & 3 \end{pmatrix}, \ b = \begin{pmatrix} -6 \\ 3 \\ 4 \end{pmatrix}$$

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